ATTACHMENT A
Remarks

Claims 27-53, 55 and 57 are pending in the present application. By this Amendment, Applicants have amended claims 27, 45, 55 and 57, and canceled claims 54 and 56.

Applicants gratefully appreciate the Examiner and her supervisor conducting a telephonic interview with their representative, Mr. Stephen Weyer, on February 20, 2008. In accordance with that telephonic interview, Applicants have amended the claims. Applicants respectfully submit that the proposed claim amendments place this application in condition for allowance based on the discussion which follows.

As an initial point, Applicants respectfully submit that this Amendment After Final is proper and should be entered, as the claim amendments do not raise new issues requiring further consideration and/or present claim amendments which require more than a cursory review, based on the previously presented claims. For example, with regard to claim 27 (currently amended), claim 27 now includes the subject matter of previously examined claim 54. In addition, claim 27 now also affirmatively recites a processor calculating a second derivative of the displacement field in the direction perpendicular to the plane of the image which obtains a representation of the measure of elasticity in two dimensions (2D) or three dimensions (3D). Previously presented claims 54 and 56 inferentially implied that a processor uses the data collected by the scanner, which focuses three different points of elevation, to obtain a representation of the measure of the elasticity in two or three dimensions. Therefore, although previously presented claim 27 did not specifically recite a processor calculating a second derivative of the displacement field, it was inherent in the previously presented claim 54 that the

recited scanner, focusing three different points of elevation based on a direction perpendicular to the plane of the image to obtain a representation of the measure of the elasticity in two dimensions (2D) or three dimensions (3D) requires the use of a processor to take the focusing data from three different points of elevation to obtain the claimed representation. Further, previously presented claim 56 recited acquiring ultrasonic signals in the different points of elevation to obtain a representation of the measure of the elasticity in two or three dimensions. In accordance with M.P.E.P. §§ 904 and 2141(II)(A), the manner in which the present invention produces the representation disclosed in the specification—by determining the aforementioned second derivative—would have been considered by the Examiner with regard to the claimed process. Accordingly, only a cursory review is necessary by the Examiner to review the amendment to claim 27, in accordance with M.P.E.P. § 714.13. Finally, with regard to process claim 45 (currently amended), claim 45 now includes the subject matter of now canceled claim 56 and, therefore, the amendment to claim 45 does not raise new issues requiring further consideration, as the subject matter of claim 45 has previously been examined in previously presented claim 56.

Turning now to the outstanding Office Action, it was alleged that claims 27-30 and 33-40 were anticipated under 35 U.S.C. § 102(b) by Fink et al. (WO00/55616) (hereinafter "Fink") and claims 31, 32 and 41-57 were rejected under 35 U.S.C. § 103(a) as being obvious from Fink, further in view of one or more of Dines et al. (U.S. Patent No. 6,574,499) (hereinafter "Dines"), Sarvazyan et al. (U.S. Patent No. 5,810,731) (hereinafter "Sarvazyan"), Verghese et al. (U.S. Patent No. 7,166,075) (hereinafter "Verghese"), Godik (U.S. Patent No. 6,002,958) (hereinafter "Godik") or Kruger

(U.S. Patent No. 6,490,470) (hereinafter "Kruger"). Applicants respectfully submit that, as amended, the aforementioned claims are not anticipated or obvious in view of the cited prior art.

With regard to claim 27, as amended, the device includes at least one echographic or ultrasonic bar comprising a plurality of transducers; a scanner that carries out scanning with the bar in one dimension or in two dimensions in two perpendicular directions in order to focus three different points of elevation based on a direction perpendicular to the plane of the image, respectively, for measuring a displacement field of the shear waves along a direction perpendicular to the plane of the image; and a processor calculating a second derivative of the displacement field in the direction perpendicular to the plane of the image to obtain representation of the measure of the elasticity in two or three dimensions. Novelty of the present device lies, in part, in obtaining a representation of the measure of elasticity in two dimensions or in three dimensions based on focusing three different points of elevation relative a direction perpendicular to the image plane for measuring a displacement field of a shear wave along the direction perpendicular to the plane of the image and calculating a second derivative of the displacement field in the direction perpendicular to the plane of the image.

The present invention is distinguishable from Fink, which does not focus three different points of elevation based on a direction perpendicular to the plane of the image and calculating a second derivative of the displacement field in the direction perpendicular to the plane of the image. To the contrary, Fink clearly discloses calculating a second derivative of the displacement field in only the x and y directions,

assuming the second derivative in the direction perpendicular to the plane of the image, i.e. the z direction, is zero. See, e.g., Fink, page 16, lines 16-22 and, in particular, the equation on page 17, line 5, which does not include a second derivative for the z component. It should be distinguished that the dimensions of the observation field of Fink, in which Fink discloses a process which is performed on an observation field having one, two or three dimensions, or the process in Fink of taking a second order derivative of two dimensions (x, y) measured in a three-dimensional observation field, is not equivalent to the claimed second order derivative of the displacement field in a direction perpendicular to the plane of the image, which is obtained using the present device having the scanner focusing three different points of elevation based on a direction perpendicular to the plane of the image. Thus, when Fink says that:

> This calculation is performed via a <u>conventional inversion process</u>, an example of which is given hereinbelow in the case of a two-dimensional observation field (the same process would apply mutatis mutandis in the case of an observation field having one or three dimensions, respectively for a single transducer T1 or for a plane array of transducers) (emphasis added),

Fink in no way teaches or makes obvious taking a second derivative of the displacement field in a direction perpendicular to the plane of the image. The <u>conventional inversion process</u> and calculation along two dimensions is described in the formula (II) on page 17, line 5, where formula (II) describes a calculation of a second derivative in the x and y direction only, presuming the second derivate in the z direction is zero or not factored, i.e. ignored.

Based on the foregoing, Applicants respectfully submit that the present device is not anticipated by or obvious in view of Fink.

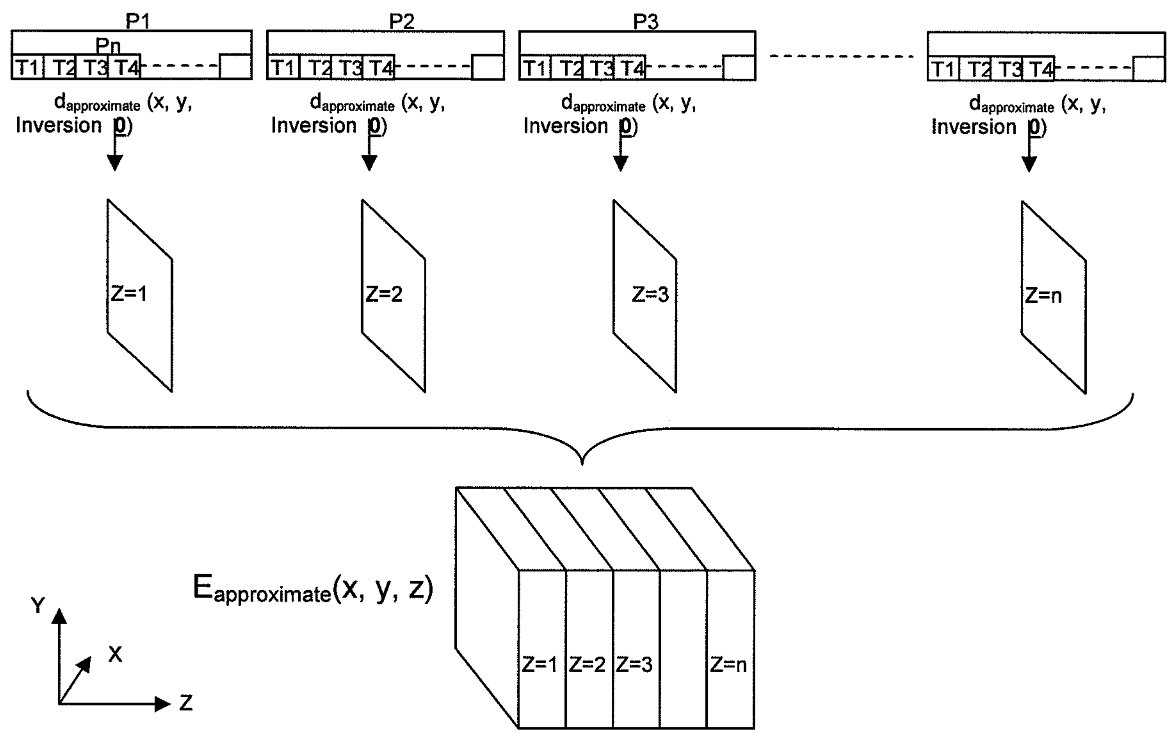
Further, Applicants respectfully submit that the additional cited prior art references, in view of Fink, fail to make obvious the claimed invention, specifically with regard to a second order derivative of a shear wave displacement field in the direction perpendicular to the plane of the image.

For example, with regard to Dines, it would not be obvious to one of ordinary skill in the art to combine Dines with Fink to make the subject matter claimed obvious, as their combination would fail to teach or make obvious all claimed elements and, moreover, there fails to be any reasonably apparent reason why one of ordinary skill in the art would combine the two references, as they are directed to two completely different imaging processes. With regard to the combination not teaching all claimed elements, nowhere in either reference is there any discussion, let alone any disclosure, which would lead one of ordinary skill in the art to take a second order derivative of a shear wave displacement field perpendicular to the image plane. As discussed above with regard to Fink, Fink ignores the second order derivative of the shear wave displacement field in the z direction. Nothing in Dines would lead one of ordinary skill in the art to calculate the second order derivative of the shear wave displacement field in the z direction.

Moreover, if one were to combine Fink with Dines, the combined teaching would not teach taking a second order derivative of a shear wave displacement field in the z direction. The combination would lead to a completely different device. For example, Dines analyzes a medium along three dimensions comprising an ultrasonic image unit and an x-ray mammography system (column 8, lines 11 and 12) which can be displaced along three dimensions: x, y and z. Of particular note, Dines does not disclose or make

obvious a process for measuring or calculating a value of elasticity based on a second order derivative estimate of a shear wave displacement field.

Combining the disclosure of Fink with Dines would produce an approximation where displacement in the z direction is still missing, but performed along three axes, as described in the figure below.



According to Dines, the linear array probe is movable to the z axis, i.e on different locations represented on the figure by P1, P2, P3,.....,Pn.

The Dines process of the association realizes the following steps in the following chronological order:

1. the generation of a low-frequency applied force or signal,
2. the acquisition of 2D ultrasonic signals,

3. the calculation of the second order derivative in the x and y directions, relating to a shear wave displacement field,

4. the inversion of the data to recover an approximate elasticity map (since the second order derivative is unknown in the z direction),

5. the displacement of the bar by the scanning means, and

6. repeating steps 1 to 4 in another point of measure.

As a consequence, the elasticity maps are incorrect because the second derivative of the displacement is not measured or calculated in the plane located on both sides of the image plane (x, y) in $z+\Delta z$ and $z-\Delta z$. Thus, the 3D representation of the elasticity would be the superimposition of 2D incorrect elasticity maps corresponding to the n positions of the ultrasonic probe.

There fails to be any reasonably apparent reason why one of ordinary skill in the art would combine the imaging device of Fink, directed to imaging based on shear waves, with the x-ray device of Dines, as they are two completely dissimilar imaging processes. In order for references to be combined in an obviousness-type rejection, there must be a reasonably apparent reason why one of ordinary skill in the art would combine such references. Such a reason may be a known problem in the art which would lead one of ordinary skill in the art to combine the references. However, neither Dines nor Fink teach or in any way make obvious any problem with their respective imaging systems. Moreover, nothing in Fink discloses a problem with regard to how it generates an image based on an assumption that the second derivative in the z direction of the shear wave displacement field is zero. It is not until one, namely the present inventors, realizes that there is relevance in determining that the second

derivative of the displacement field of the shear wave is not zero in the z direction and, therefore, that one needs to accommodate its accommodation by scanning using a process or method, as claimed, that one of ordinary skill in the art would have any reason to modify Fink. Absent the present discovery, there would be absolutely no reason to have the claimed scanner and/or processor.

Further, with regard to the other cited prior art references, Applicants respectfully submit that the aforementioned references, in view of Fink, fail to make the present invention obvious, as the combination of references fail to teach or in any way make obvious all claim elements and/or there fails to be any reasonably apparent reason why one of ordinary skill in the art would combine the references to make the claimed invention obvious.

Based on the foregoing, Applicants respectfully submit that claim 27, as currently amended, and dependent claims 28-44, are not obvious from Fink in combination with the other cited prior art references.

Referring now to claim 45 (currently amended), Applicants respectfully submit that the method recited is not obvious from Fink in view of Dines. As noted above, claim 45 (currently amended) includes the subject matter of claim 56. The present invention, as recited in claim 45, is directed to a method that Fink in view of Dines fails to teach or make obvious, namely acquiring ultrasonic signals in three different points of elevation based on a direction perpendicular to the plane of the image to obtain a representation of the elasticity of the image in two dimensions or three dimensions. Fink does not acquire ultrasonic signals in three different points of elevation to obtain a measure of elasticity in two dimensions or in three dimensions. To the contrary, Finke

merely acquires ultrasonic signals in one elevation to obtain representation in two dimensions or in three dimensions. It should be noted that even in the embodiment in Fink, which includes a plane array of transducers, Fink fails to teach or in any way make obvious using the plane array of transducers to acquire ultrasonic signals in three different points of elevation, let alone using those acquired signals to obtain a representation of the measure of elasticity in two dimensions or in three dimensions. Further, even in the embodiment of Fink, which has an array of transducers, Fink does not use the array of transducers to acquire ultrasonic signals in three different points of elevation to obtain representation of the measure of elasticity in two or three dimensions. Conversely, in the present invention, ultrasonic signals in three points of elevation are acquired and then used to obtain a representation of the measure of elasticity in two dimensions or in three dimensions.

In a non-limiting example, as discussed with regard to the device claims, the claimed representation may be based on acquiring ultrasonic signals in three different points of elevation which provide for the calculation of the second derivative of the displacement of the shear wave in the z direction, i.e. the direction perpendicular to the plane of the image, to represent a measure of elasticity in two dimensions or in three dimensions. Since Fink fails to teach or in any way make obvious acquiring electronic signals in three different points of elevation based on a direction perpendicular to the plane of the image, let alone using the ultrasonic signals to obtain representation of the measure of elasticity in two dimensions or in three dimensions, Fink fails to make obvious the claimed process.

Moreover, Fink, in view of Dines, fails to make obvious acquiring ultrasonic signals in three different points of elevation based on a direction perpendicular to the plane of the image to obtain the representation of the measure of elasticity in two dimensions or in three dimensions, as discussed above with regard to the device claims. There fails to be any reasonably apparent reason why one would modify Fink to acquire ultrasonic signals at different points of elevation, as there fails to be any known or previously recognizable benefit which would result from combining the device of Dines with the device and method of Fink.

Based on the foregoing, Applicants respectfully submit that claims 43-53, 55 and 57 are not obvious from Fink in view of Dines.

In view of the foregoing, Applicants respectfully submit that the present application is in condition for allowance.

END REMARKS